Rensselaer Iron Works Rail Mill
Foot of Adams Street and Hudson River; North of the Poesten Kill
Troy, Rensselaer County;
New York

HAER No. NY-3

PHOTOGRAPHS
WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Office of Archeology and Historic Preservation
National Park Service
U.S. Department of the Interior
Washington, D.C. 20240

HISTORIC AMERICAN ENGINEERING RECORD

RENSSELAER IRON WORKS RAIL MILL HAER No. NY-3

Location:	Foot of Adams Street and Hudson River North of the Poesten Kill Troy, Rensselaer County, New York Latitude: 42° 43' 15" N. Longitude: 73° 41' 50" W.
Dates:	Erected 1866. Major alterations after 1904. Burned October 1969.
Designer:	Alexander L. Holley, C.E., M.E. (1832-1882)
Last Owner:	Triple-A Machinery Company, Cleveland
Last Occupant:	Ludlow Valve Company (Patterson-Ludlow)
Significance:	A typical example of masonry and heavy timber factory construction; part of an important nineteenth-century iron works.

PART I. HISTORICAL INFORMATION

A. Corporate History

The rail mill of the Rensselaer Iron Works, eventually part of one of the largest nineteenth-century iron and steel manufacturing complexes, the Albany and Rensselaer Iron and Steel Company, played an important role in the heavily industrial economy of Troy.

Troy's first rolling mill was erected on the south side of the Poesten Kill by the Troy Vulcan Company in 1846. That company was succeeded by the Troy Rolling Mill Company in 1852 and sold to the illustrious and inventive iron manufacturer Henry Burden, who in 1853 conveyed the property to the Rensselaer Iron Works, owned by John A. Griswold and Company. Until 1875 the Rensselaer Iron Works was owned by John A. Griswold and Company, a firm consisting of Griswold, Erastus Corning, Erastus Corning, Jr., and Chester Griswold. It was under this ownership that the rail mill was built on the north side of the Poesten Kill in 1866. The following year the Albany Iron Works, owned by Erastus Corning and Company, consolidated with the Rensselaer Iron Works. In 1868 the Bessemer

Steel Works, owned by Winslow, Griswold, and Holley since 1863, and Erastus Corning and Company merged with the Rensselaer Iron Works; the titles were transferred to John A. Griswold and Company. By 1870 the rail mill had been converted to produce steel rails. In 1875 the Albany Iron Works, the Bessemer Steel Works and the Rensselaer Iron Works were incorporated as the Albany and Rensselaer Iron and Steel Company, thus embracing one of the oldest iron works in the United States and the pioneer Bessemer plant in America. The principal shareholders were Erastus Corning, Jr., Chester Griswold, and Selden Marvin.

Ten years later, in 1885, the corporation was reorganized as the Troy Iron and Steel Company. The rail mill was abandoned in 1896 and re-occupied by the following year by the Ludlow Valve Manufacturing Company (see below). Ludlow Valve was ostensibly the last occupant of the structure. Triple-A Machinery Company controlled Ludlow from 1960 to 1968 as Patterson-Ludlow. The plant was dismantled during the summer of 1969 and the building destroyed by fire the following fall.

B. Physical History

1. Date stone: 1866

2. Designer: Alexander Lyman Holley, an engineer who has been recognized as the father of modern American steel manufacture, was born on 20 July 1832 in Lakeville, Connecticut. His father, governor of Connecticut in 1857, manufactured cutlery. At an early age Holley exhibited an extraordinary talent for writing and drawing as well as a keen understanding of the machinery in his father's manufactory. He also had a particular interest in locomotives. Before graduating from Brown University in 1853, he had already invented a steam cut-off. From 1853 to 1854 he was a draftsman and machinist at the Corliss and Nightengale steam engine works in Providence, Rhode Island, where he worked on an experimental locomotive equipped with the Corliss valve gearing. From 1854 to 1855 he

was employed by the New Jersey Locomotive Works in Jersey City; at this time, Holley edited the journal Railroad Advocate with Zerah Coburn, superintendent of the locomotive works. In 1856 he bought Coburn's interest and edited the journal alone, changing the title to Holley's Railroad Advocate. He soon enlisted Coburn's support and the journal became Holley and Coburn's American Engineer. After only three issues publication was suspended. Holley and Coburn then went to Europe to study foreign railroad practice, publishing a comprehensive report upon their return in 1858.

From 1858 to 1863 Holley was actively writing and traveling. He patented a variable cut-off valve for steam engines and a railroad chain in 1859; the following year he prepared a list of engineering terms, definitions, and drawings for Webster's Dictionary. During this period he was scientific editor of the New York Times for which he wrote over 200 articles on engineering and traveled to Europe as a correspondent. As a technical consultant to Edwin Stevens, he went to England in 1862 to investigate ordnance and armories, a subject on which he subsequently wrote a treatise.

Holley's most noteworthy activities began, however, when he went to England in 1863 for Corning, Winslow, and Company to obtain information and the American rights for the Bessemer steelmaking process (which were subsequently combined with the conflicting Kelly patents). Holley supervised the establishment of the first Bessemer plant in the United States at Troy, New York, in 1865, and its enlargement in 1867, as well as other Bessemer works throughout the country. Holley devoted the rest of his life to the development and refinement of the Bessemer process. He became the foremost steel-plant engineer in the United States and conducted an extensive consulting practice in the design of iron and steel plants and equipment. Of the sixteen patents he obtained, ten were related to improvements in the Bessemer manufacturing process.

In 1875 Holley helped to organize, and served on, the U.S. Board for testing structural materials. He lectured on the manufacture of iron and steel from 1879 to 1882 at Columbia College School of Mines. His technical writing, profuse and seminal, included forty-one articles on American iron and steel, written in collaboration with Lenox Smith for the London journal,

Engineering. Among his other professional activities, Holley was founder and president of the American Institute of Mining Engineers, founder and vice-president of the American Institute of Mechanical Engineers, and vice-president of the American Society of Civil Engineers. Holley died in Brooklyn on 29 January 1882; a bronze bust by J.Q.A. Ward memorializes him in Washington Square in New York City.

3. Alterations and additions: The roof was raised after 1904 (Sanborn map) at which time the monitor was displaced by skylights and the gallery-level windows were added immediately beneath the cornice on the heightened side walls, and they penetrated the belt-course on the north gable end. Ancillary buildings were connected to the main mill structure; the large open archways were filled in or otherwise altered at various times.

C. Operational History

Although Holley had obtained the American rights for the Bessemer steel process in 1863, the mill was originally intended to roll iron rails, and did so until 1868. It was idle for several months during conversion for the rolling of steel rails, which commenced early in 1869. (Correspondence between John Griswold and building superintendent George Babcock, 1868-69, Griswold papers).

The following is a partial listing of "Property of the Albany & Rensselaer Iron & Steel Company, Troy, New York," 28 pp. (n.d., probably 1875 and up-dated by hand), p. 20:

RAIL MILL
Brick Building 100 x 400 feet
10 rail heating furnaces with boilers attached
Three-high 21-inch train, 3 stands of rolls
2 Sturtevant blowers
Rolls for pattern steel rails, 35 to 71 pounds [per yard]
Also rolls for rounds of iron and steel of large sizes
3 duplex Worthington pumps
3 straightening presses)
2 rail punches) Each with
3 circular saws) separate engines
Fairbanks 10-ton scales for rails
Gustin's patent straightening machine for hot bed

Main engine: 800 horse power, 36 x 44 [inches]
Blower engine: 15 x 22 [inches]

SHEAR ROOM

1 Engine: 15 x 22 [inches]
3 Double plate shears
3 Double header lathes
1 Disc Press
1 Heating Furnace
2 Grind Stones
1 Double Emery Wheel
1 Fairbanks Scales
Dimpfel blower and machine for cutting axles, etc., etc.

TANK HOUSE

Brick building adjoining rail mill, elevated wrought-iron tank, capacity 25,000 gallons. Auxiliary boiler with steam on at all times when mill is not running and connected to 2 duplex Worthington pumps having hose attachment.

An extensive, illustrated account of the Albany and Rensselaer Iron Company by Alexander Holley and Lenox Smith appeared in Engineering (London: 24 December 1880), pp. 590-92, in which the rail mill is specifically described on p. 592, as follows:

> ...A brick building 375 ft. x 98 ft., with wings [as shown by accompanying site and building plans]. There are ten coal-fired heating furnaces, each having a horizontal overhead boiler 5 ft. x 22 ft., with return flues. There are five auxiliary boilers, like those in the Bessemer department. The train is 21 in., three-high, with three stands of merchant rolls arranged to deliver to the rail sawing and finishing apparatus. The whole mill can thus be utilized as a merchant mill for medium and heavy work, when this pays better than rails; or both rails and merchant steel can be produced on different turns, when there is not demand enough for either product to alone fill the mill. The rail-train engine, vertical and condensing, has 3 ft. stroke and a 44 in. cylinder with Corliss valve gear, revolutions 80, boiler pressure 70 lb.

> The Gustin hot-curving apparatus is employed.... The rails, being uniformly curved without twisting by hand movement, are nearly straight when they get cold, and so require little cold straightening; they are therefore not subjected to that distortion and weakening which formerly caused so many fractures at the gag-marks. The double hot-bed and finishing machines are of good type and capacity. Eighty 7-in. blooms are charged into the ten furnaces per "round," and there are seven rounds per turn, thus producing 1120 rails per 24 hours. The heating coal, which also produces the greater part of the steam for the engines, is 460 lb. per ton of rails. The wing at the finishing end of the rail mill is devoted to the manufacture of 120 tons per week of agricultural shapes, such as harrow discs, & c. Materials and product are at this group of works received and delivered by the New York Central and Hudson River Railway on one side, and by the Hudson River on the other side.

D. Historical Associations

1. Industrial development: The historical position of the Rensselaer Iron Works in Troy can be established and understood within the context of American industrial development by Alexander Holley's 1880 description. He lists several key factors which encouraged the growth of an extensive nineteenth-century complex, 150 miles up the Hudson from New York City. (Actually, the seed of industry in the south Troy area was John Brinkerhoff's nail factory, established at the mouth of the Wynants Kill in the late eighteenth century, and his rolling mill, built on the north bank of the stream in 1807) The Hudson River itself and the "remarkable pass at West Point" (the only major break in the Appalachian chain) were the first factors on Holley's list. Troy, at the head of the Hudson's tidal waters, provided linkage with transportation systems east, west, north, and south; three miles of wharves lined its waterfront; and a network of railroads radiated from it--the New York Central, Boston and Albany, Delaware and Hudson, Troy and Boston, and the Boston Hoosac Tunnel--connecting

Troy to anthracite and bituminous coalfields 200 miles west, to the Lake Champlain ore mines 100 miles north, to the limonite beds 30 to 60 miles south and east, and to numerous markets. The Erie Canal, as well, afforded cheap transportation to the Great Lakes and westward. Flowing up the Hudson from New York City came a steady supply of immigrant labor, seeking whatever work the entrepreneurs could provide. Good markets for merchant and specialized iron and steel in New England and New York were as accessible as the sources of raw material and labor. Further, as the territories in the West filled in following the Civil War, there was an increased demand for manufactured goods such as steel rails and farm implements that were already being produced by Troy industries.

2. The Monitor: The reputation and productivity of the Rensselaer Iron Works can be emphasized by the part it played in fabricating iron plates for the Monitor during the Civil War. An 1880 account of the building of the ship, in Nathaniel Sylvester's History of Rensselaer County, New York, notes the company's participation, p. 222:

> Among the ennobling acts of patriotic men during the several dark crises of the late Civil War, is the memorable service rendered the government by John A. Griswold, of the Rensselaer Iron-Works, and by John F. Winslow, of Albany Iron-Works, who, profoundly impressed with the deplorable ineffectiveness of wooden vessels of the United States Navy, earnestly urged upon the authorities the construction of that novel iron-battery, the Monitor, invented by John Ericsson. For not only did these men strongly advocate the building of the vessel, but they had the courage and enterprise to willingly hazard their reputations and money in building their experimental warcraft.

Contracts were let expediently to Corning, Winslow, and Company and to the Rensselaer Iron Company for all the rolled-plate armour and rivets to be used in the construction of the ship. Work began immediately and proceeded with rapidity. The Monitor was launched 30 January 1862, only 101 days after the contract date.

3. John A. Griswold: The principal partner in the Rensselaer Iron Works, Griswold was born in Nassau, New York in 1818, and he came to Troy in 1839 where he lived with his uncle, General Wool. In 1850 he was elected Mayor of Troy. Griswold's Civil War effort included not only his cooperation in building the Monitor, but also his activity in raising regiments.

   In 1862 he was elected to the United States Congress as a War Democrat and subsequently served in the House of Representatives from 1863 to 1867 as a Republican; he is appropriately pictured with the Committee of Naval Affairs. In 1868 he was defeated for the Governorship of New York. Griswold served as a trustee of the Rensselaer Polytechnic Institute. He died in October 1872.

E. Sources of Information

1. Unpublished sources:

Albany. New York State Library. John A. Griswold papers.

Washington. Smithsonian Institution, National Museum of History and Technology, Division of Industries, Holley Collection. Holley's plan of rail mill.

2. Published sources:

American Iron and Steel Association. The Ironworks of the United States. Philadelphia, 1876.

Beer's Atlas of Rensselaer County, 1876.

Malone, Dumas, ed. Dictionary of American Biography, New York: Charles Scribner's Sons, 1933.

Holley, Alexander L. "The Albany and Rensselaer Iron and Steel Works, Troy, New York," Engineering (London, 24 December 1880), pp. 590-592.

New York State Engineer's Report, 1869.

Sylvester, Nathaniel. History of Rensselaer County, New York. Philadelphia: Everts and Peal, 1880.

Weise, Arthur J. "History of the City of Troy," Centennial Manual. Troy, 1876.

Research by Lewis Rubenstein
Historian
Hudson River Valley Commission

Prepared by R. Carole Huberman
Historian
Historic American Engineering Record
May 1971

PART II. ARCHITECTURAL INFORMATION

A. General Statement

1. Structural character: Typical masonry and heavy timber construction.

2. Condition of fabric: Structurally sound, in average condition for heavy-industrial plant of its age.

B. Description of Exterior

1. Number of stories: One with full perimeter gallery

2. Number of bays: 29 in length

3. Over-all dimensions: 99 feet x 379 feet

4. Layout, shape: Rectangular with several appended wings on the sides.

5. Wall construction, finish, and color: Solid red-brown brick bearing walls 16 inches thick with 4-inch pilaster projections on interior and exterior.

6. Structural system: The roof is carried by composite heavy-timber and iron (or steel) trusses, the bottom chord scarffed at the center. The gallery's outer edge is supported by wood posts that continue upward to the roof-truss bottom chords. On the inside face of each

column is a similar column supporting the heavy-timber crane rails, at the gallery floor level. Knee braces and horizontal struts, set into cast-iron pockets on the side faces of the crane columns, brace the entire system longitudinally.

7. Openings:

a. Doors and doorways: In the north elevation is a large central materials doorway with steel I-beam lintel and rolling door, all of fairly recent origin, and a man door in the first bay to the west of center with fixed 5-over-5 sash above, also later. There are also three former archways with pointed-arch heads, probably originally to pass the chimney breeching of the combined rail heating furnaces-boilers. These are now partially bricked in and are occupied by twin 4-over-4 double-hung sash under segmental brick heads. The side walls of the original block are pierced in each bay by round-arch openings, some leading to the later wings, some closed off or filled with doors or windows. As was common in rolling mills of the period, these openings originally were not provided with doors, the fullest ventilation being sought in warm weather and adequate warmth in the cold being furnished by radiation from the furnaces and hot metal in work. In the north end of the west wall are three round-arch openings, each spanning two bays, that open into an original wing on the northwest corner, now incorporated into the later wings.

b. Windows: The original windows, which have shallow brick hood detail, in the upper level of the north end consist of a central pointed-arch window with regular mullions and congruently arched fan mullions, flanked by two round-arch windows with double-hung sash, 10-over-10 glazing and fanlights. Cast-iron roundels above the open archways may have originally provided additional ventilation, but they were later filled with masonry. When the roof was raised, twin, double-hung windows were added with 4-over-4 wooden sash set into segmental arch frames at the gallery level. In the side elevations these windows appear regularly, one pair per bay, immediately under the raised cornice. In the north gable end, the windows, set at two different levels, break into the original beltcourse.

8. Roof:

a. Shape, covering: The north wall clearly shows that the original roof was approximately 8 feet lower than the existing plank-sheathed, slate-shingled roof and had a central monitor. (The south wall does not exhibit the line of the lower monitor roof as does the north; therefore, it can be inferred that no part of the south wall is original, and that possibly it is not in its original location.) The wood trusses and possibly the gallery framing date from the raising of the roof. There is a 10-foot by 17-foot skylight within each bay of the roof.

b. Cornice, eaves: The cornices on the side walls are similar to the corbeling and coursing of the original beltcourse on the north gable wall. The later cornice on the north end wall has an interesting corbel of trapezoidally shaped brick.

C. Description of Interior

1. Floor plan: A single production area with a center and two side aisles is formed by the two rows of gallery and crane columns. Various wings open directly into main area. The perimeter gallery is approximately 27 feet wide and 17 feet above the ground floor. Two 20-ton bridge cranes command the main aisle.

2. Stairways: Five wooden stairways provide access to the gallery space from the ground floor.

3. Flooring: The ground floor is concrete; the gallery floor is of wooden plank on joists.

4. Wall and ceiling finish: The walls and timber system are painted.

5. Heating: None originally (See openings: Doors and doorways, above) and none evident now. Various forms of space heaters were probably used by Ludlow.

D. Site and Surroundings

1. Setting: With its long axis almost directly north-south, the rail mill was part of a once thriving industrial complex located between the New York Central Railroad tracks (now Penn Central) on the east and the Hudson River on the west. The Poesten Kill cuts through the site just south of the mill.

2. Outbuildings: Machine shops and storage buildings were connected to the original mill along both sides for its entire length. To the north and west are various other Ludlow buildings.

Prepared by Charles A. Parrott III
Student Architect
Iowa State University
September 1969

Additional notes by Robert M. Vogel
Curator of Mechanical and
Civil Engineering
Smithsonian Institution

PART III. PROJECT INFORMATION

These records were prepared as part of the Mohawk-Hudson Area Survey, a pilot study for the Historic American Engineering Record which was established in 1969 under the aegis of the Historic American Buildings Survey. The project was sponsored jointly by the National Park Service (Historic American Buildings Survey), the Smithsonian Institution (National Museum of History and Technology), the American Society of Civil Engineers (National Headquarters and Mohawk-Hudson Section), and the New York State Historic Trust. The field work and historical research were conducted under the general direction of Robert M. Vogel, Curator of Mechanical and Civil Engineering, Smithsonian Institution; James C. Massey, Chief, Historic American Buildings Survey; and Richard J. Pollak, Professor of Architecture, Ball State University, Project Supervisor; and with the cooperation of the Department of Architecture, Rensselaer Polytechnic Institute.

HISTORICAL ADDENDUM

LUDLOW VALVE MANUFACTURING COMPANY

Troy, New York (1866-1969)

The Ludlow Valve Manufacturing Company, by its very name, indicates clearly the roots and rationale of its existence. The name Ludlow was that of the man who created the company by virtue of a patented invention that was its principal asset. The term "Valve" in the title refers to the device whose manufacture was to become the principal purpose and product of the company. It provided a tight and secure means for controlling the flow of liquid or gas through pipe lines. Pipe lines and networks were to become, almost as much as the railway, principal indexes of technological progress in nineteenth-century America. Moreover, a consequence of the increasing urbanization of American society was the requirement of an adequate supply of water and gas, distributed through mains in the streets and structures of even the smallest towns. Only their concealment beneath the surface prevented these pipes from being as prominent a feature of the scene as the rails and electric wires which have disfigured as much as they have served the community. All are an equally characteristic measure of the mobility of man and his products which is the distinctive feature of modern society, especially in the cities.

Henry G. Ludlow's inventive ingenuity contributed at once to the necessities of city living and to the origin and growth of an important industry in the city of Troy. With Henry Burden, inventor of the horse shoe machine, and Mrs. Hannah Montague, the somewhat legendary originator of the separate man's collar, Ludlow gave a special character and significance to Troy's industrial role in the nineteenth century. Their decline of these key industries, too, has affected and aggravated the condition of Troy in the present period. The Ludlow Manufacturing Company is just now (August 1969) undergoing a removal which will leave Troy with little of its old, historic, industrial pattern. One small valve plant, the Ross Valve Manufacturing Company, now remains in Troy as a reminder of its one-time importance in this field, when there were a half-dozen valve manufacturers in the immediate area, and Ludlow was the largest in the nation, if not the world. Ironically, but also interestingly,

the buildings that once housed the Ludlow Company are empty for the first time. Earlier, in 1896 they were abandoned by the Rensselaer Iron Works when the Troy Iron and Steel Company, of which it was a part, contracted its operations before closing down completely shortly thereafter. Then in 1897 these buildings acquired a new occupant in the expanding Ludlow Valve Manufacturing Company. At the time of this writing they are in a shabby state of disrepair, with little prospect of a new tenant. They give promise of decay, deterioration, and destruction, which further intensifies the ghost-like character of south Troy, unless revived under an urban renewal scheme. [Destroyed by fire in October 1969, the building's fate lies no longer in question, (ed.)].

Henry Ludlow's preparation for his career as a valve inventor and manufacturer is important and relevant. Born in Nassau, New York, in 1823, the son of a lawyer and judge, Ludlow was educated in the schools of Oswego, New York. He was graduated as an engineer from Union College in Schenectady in 1843 and entered the field of gas manufacture in Philadelphia. For a number of years he directed the construction of gas plants in various cities. He became a member of the firm of Dungan, Streeter, and Company, which specialized in this business. While supervising the building of a gas plant in Poughkeepsie, New York, Ludlow became interested in the development of a valve which employed a single disc or gate with wedge and bar to keep it firmly in place when closed. This was patented and later Ludlow improved the device which was patented and publicized as the "Double Disc Parallel Seat Gate Valve." A "Slide Gate" fire hydrant was added to the patented valve, these devices becoming the basis of Ludlow's business activity for the remainder of his life.

Interested in initiating their manufacture, Ludlow settled in Lansingburgh just north of Troy, where he began in a small way in the first years of the Civil War. According to oral legend, he would cross the only bridge then spanning the Hudson to Waterford, where he had castings made in a small foundry. He machined and assembled these into valves and apparently sold them himself. The Ludlow Valve Manufacturing Company was founded in 1861, but formal manufacture did not begin until 1866, in a small shop in Waterford. Business grew, and in 1872 it was moved to larger

quarters in Lansingburgh. At this time, too, Ludlow acquired the business assistance of a Lansingburgh insurance man, John T. Christie, who became treasurer and subsequently president of the Ludlow Company.

Thus was added another complex metal product to the substantial list of horse shoes, stoves, bells, surveying and scientific instruments, rails, and railroad hardware for which the Troy area became noted in this period. All of them required, aside from basic materials, relatively complex machinery and male labor skilled in the mechanical arts. The last was supplied by the flood of immigration from Europe, which brought to Troy and to the United States in general a vast reservoir of labor, both skilled and unskilled. Troy, along with its neighbors, Cohoes and Watervliet, became in this period a poly-ethnic community, in which a relatively small middle class, predominantly Anglo-Saxon and Protestant, employed and controlled a considerable variety of other ethnic groups, primarily Catholic, among them Irish, German, French-Canadian, and subsequently others. Friction and division between upper and lower classes developed on a social and political level, but principally on an economic basis. Labor conflict and unions thus appeared early in the area's industrial relations and gave rise over the years to difficulties which may in the long run have weakened and undermined industry in Troy and its neighboring communities.

The valve industry possessed some peculiar characteristics, particularly in relation to its market. This was, almost from the first, national in scope and consisted primarily of gas and water utility companies, both public and private. A special kind of salesmanship was required, combining technical, business, and even political skills. Each city's needs had, as it were, to be individually appraised and supplied with suitable and often specially designed valves. Standardization of product was difficult, if not impossible. Competition among makers was keen, and a certain degree of political persuasion was often a consideration in the final award of contracts. Winning municipal business of this type carried with it a certain advantage of priority in subsequent repairs and replacements.

Interestingly, the Troy area acquired other valve producers in the same period as the Ludlow Company. Among these was the Eddy Valve Company of Waterford, which claimed an even earlier origin at mid-century as a foundry for castings,

probably including those for Ludlow's valve. Isaac Eddy's son, George Washington, devised a "taper-seat" valve in 1873 and later on a "Mohawk" hydrant. Thus began a rival valve concern which, under the ownership of the principal business family of the region, the Knickerbackers, survived until its recent absorption by an Ohio company. Another valve manufacturer was the Rensselaer Company, which began as a scale manufacturer. By 1887 it was located in Cohoes, across the Hudson from Troy, and it too, developed a line of valves. The firm was later merged with the Ludlow Company in a final effort at revival of the industry.

In 1896, the Ludlow Valve Manufacturing Company made another move, to the plant in south Troy. It was not only larger but also better situated than the Lansingburgh works with reference to railroad and river transportation. In the site, located on the Poesten Kill at its junction with the Hudson River, was an extensive complex of structures, once the seat of the Rensselaer Iron Works.

In its new works Ludlow prospered and expanded into the largest valve manufacturer in the United States. It catered to a world market through a large network of sales agencies, which included a Canadian Ludlow Company in Montreal.

In part, this growth was due to the accelerated expansion of urban population, in part also to the growing demand of the oil industry for pipe line valves, which Ludlow supplied. The success of the company was also due to continuing good management. Upon Henry Ludlow's retirement in the early 1890's, he was succeeded as president by John T. Christie, but more important was the appearance in the firm of Christie's son-in-law, James H. Caldwell. A graduate of Rensselaer Polytechnic Institute in 1886, Caldwell was the scion of a family that had developed the gas manufacturing industry in the South. He combined technical and business skills and applied them for more than forty years to the Ludlow valve business. It may be noted that Henry Ludlow's only son was not interested in valve making, but instead became a founder and dominant figure in the Troy Record, Troy's only surviving and successful newspaper.

Significantly, the Ludlow Company underwent a change of ownership in that period which was to have serious con-

sequences at a later period. Henry Ludlow, on retiring from active management, wished to dispose of his large interest in the company. The purchasers were a group of New York capitalists, among them the lawyer Samuel Untermeyer and his brothers, Marcus Stine, and Max Nathan. Thus was introduced an element of absentee ownership and management, which was, however, content with profits, as long as presidents Christie and Caldwell were able to produce them. Difficulties developed in a reluctance by these absentee owners to invest capital in necessary technological improvements both in the products and processes of manufacture. The difficulty became more serious in the 1930's when James H. Caldwell retired and, more particularly, when growing depression cut into both production and profits. The problem of management now became acute and was resolved only partially when the Untermeyer group of New York designated Caldwell's son-in-law, Livingston W. Houston, also a graduate of Rensselaer Polytechnic Institute, as president.

Houston introduced severe cuts and economies into Ludlow operations, but the effects of continued depression were not easily overcome. There was a serious loss of the oil business, as the latter turned to more compact steel valves, by contrast with the cumbersome ones of cast iron. Ludlow valves were left primarily with a declining market in water and gas installations. Houston shortly thereafter left the Ludlow presidency for employment after 1935, first as treasurer, then as president of Rensselaer Polytechnic Institute. Nevertheless, it was Houston, perhaps because of past family associations, who after World War II engineered the sale of the Untermeyer interests to a local group consisting of himself and other Troy investors. Ludlow was once more a locally owned company, as it had been in the beginning. The problem now was whether the company could be rebuilt and restored to its one-time leadership in the valve industry. This purpose determined the direction and intensity of effort during the next two decades. Despite some early success, the program and its objectives failed, ending in bankruptcy and final liquidation after 1960.

During this period Houston served as chairman of the Board of Directors. Of necessity compelled to devote his primary energies to the Rensselaer Polytechnic Institute presidency, he could only influence and direct the company's business use at a distance. The main quest of the Troy ownership group was for a competent president to manage Ludlow effectively in a difficult time. In this they never really succeeded. A succession of

presidents followed one another, proving either too weak or too assertive, and none seemed effectual. Perhaps also there was a lack, aside from business management, of adequate technical direction, especially vital in an industry based on technology. A further impediment to efficient operations was the difficulty of product standardization, resulting from widely varying customer requirements and a large repair business from old, non-standard systems. As a result, large stocks of patterns had to be maintained, and large production runs were uncommon.

World War II brought a temporary and special kind of boom in Ludlow's fortunes with a demand for special naval and maritime equipment. The United States Navy even financed a foundry for steel castings as a wartime addition to the Ludlow plant. However, the problems returned after the war, perhaps in even more acute form. Many factors were at work, causing difficulties and retarding development. New plants had come into existence in the South and West, with great advantages of location, access to materials and markets, and more advanced methods. Labor relations in Troy were troublesome as half a dozen separate unions in an old industry pressed for better wages but resisted technological innovations by slow-downs. The condition of divided and ineffective management persisted, as the search for a permanent and energetic president continued. Working capital was tight, allowing little if any surplus for improvements.

Interestingly, in 1954, came a last great effort to assure survival and even some hoped-for improvement. This took the form of a merger with another Troy-area valve company, the Rensselaer Valve Company of Cohoes. Claiming almost equal antiquity and character, Rensselaer was in almost equal difficulty. Much of the hope and promise lay in the acquisition of another line of valves and hydrants, as well as in the superior management available and in some improved machinery. More important, however, was the prospect of achieving economies and the reduction of personnel by a physical consolidation of the two concerns in the Ludlow plant.

The dismantling of the Rensselaer works was, however, delayed. In the meantime both plants continued separate operations, and the distance between them alone made cooperation difficult. The costs of removal were great and intensified the shortage of working capital. Annual losses were more frequent than earnings. A fateful step in the history of the Ludlow Company occured when it was forced to negotiate a substantial loan, exceeding a million dollars, with a New York factoring organi-

zation, James Talcott and Company. It proved too great a burden, and early in 1960 the Talcott company initiated foreclosure proceedings against Ludlow. The works were immediately closed, throwing out of work some 450 employees, left of an earlier 800 divided between the Ludlow and Rensselaer plants.

Court proceedings for bankruptcy and possible reorganization began, and the problems of the company were aired both in court and in the press. Somewhat belatedly, the unions became concerned about the jobs of their members. There was a conflict of interests between the outside factoring organization interested only in their loan, and the local ownership group which hoped for a resumption of activity. In the complex testimony that emerged, the unhappy state of the company was revealed.

Total assets were reported at nearly $3.5 million, divided among physical facilities, valued at some $1.5 million, and inventories, accounts receivable, and cash. Against this, liabilities were estimated at about $2 million, of which nearly half was represented by the Talcott claims. There was, however, a substantial backlog of orders to warrant resumption of operations.

The last years of this old company thus began in the shadow of bankruptcy and controversy. The resumption policy won out in 1960 when the Troy group sold its interests for a nominal sum to a purchaser from Cleveland, representing the Triple-A Machinery Company, in the used and scrap machinery business. Triple-A assumed all liabilities and for several years, until October 1968, operated the company on a much reduced scale, as a division of a subsidiary, Patterson Industries. The handicaps of absentee ownership plus all of the old difficulties proved too great, however, and in 1968 all production ceased. A year later, in the summer of 1969, the plant was dismantled. Usable equipment was removed to East Liverpool, Ohio, where production is to be continued under the hybrid name, Patterson-Ludlow. The real import of the name Ludlow, with its history of a century is, however, gone. Another of Troy's nineteenth--century industries, once prospering and successful, has come to an end with a final whimper.

A consideration of Troy's industrial history since the nineteenth century, aside from the specific problems of each industry, brings forth two questions: why, in the first

place, did Troy become so prominent a center of American industry; and why, in the second place, did the problems that have lead to its steady decline over the last half century arise?

Principal Sources of Information

Consultations with and considerable company materials obtained from

a) Mr. L. W. Houston, former president of the company and chairman of the board.

b) Mr. Edwin A. Weinberg, former vice-president and works manager.

c) Mr. Raymond Lague, superintendent of the plant in its last days and supervisor of its final break-up and removal from Troy.

Numerous news stories in the Troy press, illustrating both the triumphs and the travails of the company.

Catalogues and other publications of the Ludlow and Rensselaer Valve Companies.

Weise, A. J., The City of Troy and Its Vicinity. Troy, 1886.

Weise, A. J., Troy's One Hundred Years. Troy, 1891.

Prepared by Samuel Rezneck
Professor Emeritus of History
Rensselaer Polytechnic Institute
August 1969